BMP PATHWAY AND RETINAL ASTROGLIOSIS

Subramanian Dharmarajan, Nadeer Sheibani[1], (Teri Belecky-Adams), Department of Biology, Purdue School of Science, Indiana University–Purdue University Indianapolis, Indianapolis, Indiana 46202.

Astrocytes are the star shaped glial (non-neural) cells present in the central nervous system. The astrocytes perform a wide range of functions including: serving as an energy source, aiding neuronal development, maintaining homeostasis and detoxification. Astrocytes are also present in the eye, constituting the majority of the glial cell population and are found in the retina. Any injury to nearby neurons makes the astrocytes reactive, altering their function and morphology. One of the features of reactive astrocytes is to form a physical barrier around the injury site, called the glial scar. One group of molecules thought to play a role is the bone morphogenic proteins (BMPs). Although, the BMPs have been found to increase in CNS following injury, their role in making the retinal astrocytes reactive is not yet known. Our purpose in performing these studies was to clarify the role of BMP7 (a type of the BMP) in retinal astrocytes reactive gliosis.

Mouse retinal astrocyte cells were incubated with sodium peroxynitrite (a strong oxidizing agent, which has been previously shown to make astrocytes reactive) or different cocncentrations of BMP7 for different time periods. Cells were lysed and total protein or total RNA was isolated to analyze the protein and gene expression levels of different markers.

Treatment with peroxynitrite led to statistically significant increase in levels of expression in including astrocyte specific markers and certain inhibitory molecules. In the BMP7 treated samples, similar increases in the levels of expression for the astrocyte specific markers and the inhibitory molecules. A comparison between the expression profiles of peroxynitrite- and BMP7-treated cells showed largely (but not completely) overlapping profiles of expression.

The work done here helps ascertain the role of BMP7 in reactive gliosis in vitro. Further, the observation of distinct reactivity profiles under different conditions is indicative of involvement of additional pathways.

[1]Department of Ophthalmology and Visual Sciences, University of Wisconsin, School of Medicine and Public Health, 600 Highland Avenue, K6/458 CSC, Madison, WI-53792-4673